HOW TO SUPPORT ENGLISH LANGUAGE LEARNERS IN THE MATHEMATICS CLASSROOM

2014 MEGA Conference

Reasoning and Argumentation

Which has more volume:
100 pounds of feathers or 100 pounds of bricks?

Mathematical Practices

1. Make sense of problems and persevere in solving them
2. Reason abstractly and quantitatively
3. Construct viable arguments and critique the reasoning of others
4. Model with mathematics
5. Use appropriate tools strategically
6. Attend to precision
7. Look for and make use of structure
8. Look for and express regularity in repeated reasoning

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1. Make sense of problems and persevere in solving them
2. Attend to precision

2. Reason abstractly and quantitatively
3. Construct viable arguments and critique the reasoning of others

Reasoning and explaining

4. Model with mathematics
5. Use appropriate tools strategically

Modeling and using tools

7. Look for and make use of structure
8. Look for and express regularity in repeated reasoning

Seeing structure and generalizing

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Mathematical Practice 1

Make sense of problems and persevere in solving them

- *Explain* the meaning of the problem
- *Plan* a solution pathway
- *Determine* if the solution is reasonable and accurate
- *Explain* correspondences among models, pictures, diagrams, equations, verbal descriptions, tables, and graphs

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Mathematical Practice 3

Construct viable arguments and critique the reasoning of others

- *Explain* the reasoning underlying a strategy, solution, or conjecture
- *Arguments* may rely on definitions, previous results, properties, or structure
- *Present* your arguments
- *Articulate* and *Justify* generalizations
- *Listen to* or *Read* arguments of others. Ask questions to clarify or improve the argument.
- *Communicate* their arguments, *compare* them to others as well as *respond* to the critiques of others

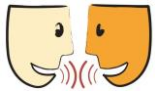
Mathematical Practice 6

Attend to Precision

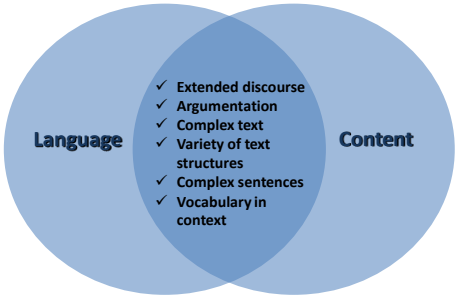
- *Formulate* precise explanations
- *Use* math vocabulary
- *Use* appropriate labels to *communicate* the meaning of the representation
- *Record* their work

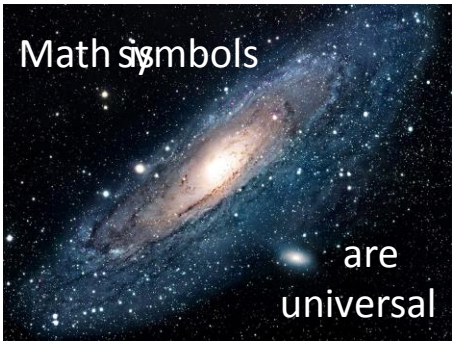
Table Talk

1. How did this activity engage you with the mathematical practices, processes, and language?



What does it mean to utilize content?



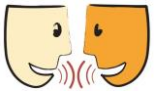


Supporting Language in Content

- ELLs must have opportunities to engage in quality, sustained, deep interactions to build knowledge.
- Dialogue involves the exchange of ideas and is not dominated by one party.
- Dialogue between peers builds on participants' ideas to promote improved understanding of concepts.
- Knowledge is jointly constructed through the use of language.
- Talk is about the subject matter of the discipline and encourages reasoning, application of ideas, argumentation, forming generalizations, and asking questions.

Table Talk

2. How did the activity support and challenge ELLs?



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2. ELD Strategies in Math

- Grouping Structures
- Understanding the Problem
- Writing Problems
- The Language of Mathematics
- Graphic Organizers
- Word Walls
- Modeling of Think-Alouds
- Learning Journals
- Academic Language Scaffolding
- Directed Reading-Thinking

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3. Mathematical Practices

Grouping Structures	General Problem Solving
Understanding the Problem	MP 1. Make sense of problems & persevere in solving them
Writing Problems	MP 2. Reason abstractly and quantitatively
The Language of Mathematics	MP 6. Attend to precision
Graphic Organizers	
Word Walls	MP 6. Attend to precision
Modeling of Think-Alouds	MP 6. Attend to precision
Learning Journals	MP 3. Construct viable arguments & critique the reasoning of others
Academic Language Scaffolding	MP 6. Attend to precision
Directed Reading-Thinking	Literacy in Mathematics

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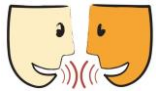
Table Talk

3. What kind of supports will teachers need to implement instruction that develops complex language through meaningful use of content?



Supporting ELL Students on an ILLP

The Individualized Language Learner Plan (ILLP) has three required documents that must be completed.

1. Individual Language Learner Plan (ILLP) Document
2. Attachment A
3. Attachment B

Individual Language Learner Plan (ILLP) – Attachment A

*Student Name:	*SAIS ID #:	*AZELLA Overall Proficiency Level: *AZELLA Date:	
*ILLP Teacher Signature/Date:	*ILLP Teacher Signature/Date:	*ILLP Teacher Signature/Date:	*ILLP Teacher Signature/Date:
*Re			*Target Date
*Oral			
*Grammar	*60 minutes	Y N	

Please take a moment to raise your hand if you have provided or supervised instruction of an ELL student(s) using an ILLP?

Revised: June 2013 * Indicates required information to be included Original Document placed in student's cumulative file.

** Indicates if content Highly Qualified / specify content area Copy to identified ILLP classroom teacher(s)

Attachment A

- This document is completed and signed by all teachers responsible for instruction on the ILLP.
- ELP Standards and Performance Indicators must be identified for each time allocation.
  - ✓ It is recommended that each ILLP area address four to five Performance Indicators selected for each quarter
  - ✓ The result of a collaborative effort between teachers on the ILLP
- Document the ELPS from Attachment A that are being used to differentiate instruction.
  - ✓ Document daily or weekly in lesson plans or elsewhere in the classroom
  - ✓ Use coding and write out the Performance Indicator

ILLP Team

At the end of each quarter or grading period…

- The team will review and revise the goals in the ILLP(s).
- The team may choose to change the responsibility of the allocations based on schedule changes or long term plans.

Quarter (Grading Period) 1	
Language Arts	Grammar
Math	Oral English Conversation/Vocabulary
Science	Writing
Social Studies	Reading

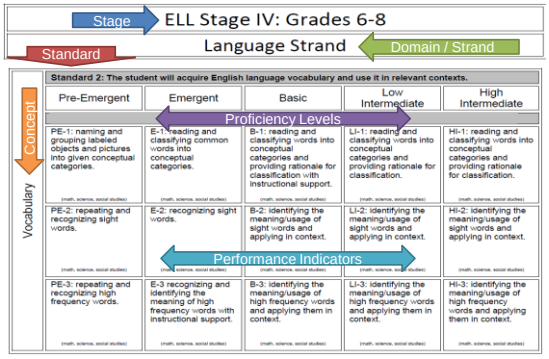
Time Allocations
for all Grades and All Proficiency Levels

Time Allocation	**Oral English/ Conversation AND Vocabulary** **60 minutes**	**Grammar** **60 minutes**	**Writing** **60 minutes**	**Reading** **60 minutes**
Standards to Use	**Listening & Speaking Domain** AND **Language Strand** Standard 2 •Vocabulary	**Language Strand** Standard 1 •Standard English Conventions	**Writing Domain**	**Reading Domain**

Stages (Grade Band)

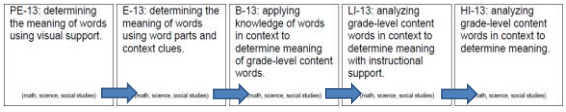
- ELL I corresponds to Kindergarten
- ELL II corresponds to grades 1-2
- ELL III corresponds to grades 3-5
- ELL IV corresponds to grades 6-8
- ELL V corresponds to grades 9-12

Organization



Progression of Skills

- Progression of Skills across Proficiency Levels
  - Complexity of task
  - Varied level of teacher support



Content areas of Math, Science, and Social Studies are referenced where the specific Performance Indicator lends itself well to using these materials.

Choosing ELPS for the ILLP

1. AZCCRS Math Content Standards
   - What am I teaching this quarter?
2. ELD Strategies in Mathematics
   - What are some ways I can support English language development in Math?
3. Mathematical Practices
   - Which mathematical practices can I connect to the above strategies?
4. ELPS
   - Which ELPS encompass the identified mathematical practices?

AZCCRS

Domain:
Ratio and Proportional Reasoning

Cluster:
Analyze proportional relationships and use them to solve real-world and mathematical problems

Standard (7.RP.A.1) :
Compute unit rates associated with ratios of fractions, including ratios of lengths, areas and other quantities measured in like or different units.

ELL Strategies and the Mathematical Practices

Grouping Structures	General Problem Solving
Understanding the Problem	MP 1. Make sense of problems & persevere in solving them
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The Language of Mathematics	MP 6. Attend to precision
Graphic Organizers	
Word Walls	MP 6. Attend to precision
Modeling of Think-Alouds	MP 6. Attend to precision
Learning Journals	MP 3. Construct viable arguments & critique the reasoning of others
Academic Language Scaffolding	MP 6. Attend to precision
Directed Reading-Thinking	Literacy in Mathematics

Implementing the ILLP

- **AZCCRS Standard:** 7.RP.A.1
  - Compute unit rates associated with ratios of fractions, including ratios of lengths, areas, and other quantities measured in like or different units.
- **AZCCRS Mathematical Practices**
  - MP3: Construct viable arguments and critique the reasoning of others
  - MP6: Attend to precision
- **ELP Standards from the ILLP**
  - IV-LS-1: HI-8: Offering justifying opinions and ideas in response to questions and statements in academic discourse.
  - IV-L-2: HI-4: Explaining the meaning and usage of grade-specific academic vocabulary and symbols
  - IV-L-2: HI-13: Analyzing grade-level content words in context to determine meaning
  - IV-L-2: HI-14: Using reference materials, print and/or electronic, to identify meanings, spelling, pronunciation, and usage of words.

Describe the quantities you want to measure by talking about what units we use to measure each quantity.

a. *One quantity measures the number of papers, and the other measures the number of seconds.*

PE-4: identifying grade-specific academic vocabulary including key words, symbols, or operations with instructional support. (math, science, social studies)	E-4: identifying grade-specific academic vocabulary including key words, symbols, or operations. (math, science, social studies)	B-4: categorizing grade-specific academic vocabulary and symbols by content. (math, science, social studies)	LI-4: explaining the meaning of grade-specific academic vocabulary and symbols with instructional support. (math, science, social studies)	HI-4: explaining the meaning and usage of grade-specific academic vocabulary and symbols. (math, science, social studies)

Definition: Class- Self-	**Related Words:**
Example: Mathematical- Real-Life-	**Non-verbal Representation:**

Measure

Your Turn

Which has more volume:
100 pounds of feathers or 100 pounds of bricks?

1 

2 

3 

5.MD.C **Geometric measurement: understand concepts of volume and relate volume to multiplication and to addition.**

PE-8: responding to academic content ideas and concepts by using key words, phrases, and gestures. (math, science, social studies)	E-8: responding to academic content ideas and concepts by using key words in complete sentences. (math, science, social studies)	B-8: responding to questions and statements in an academic discussion by using key vocabulary in complete sentences. (math, science, social studies)	LI-8: responding to questions and statements in an academic discussion by using key vocabulary in complete sentences. (math, science, social studies)	HI-8: offering and justifying opinions and ideas in response to questions and statements in academic discourse. (math, science, social studies)

Revisit the activity we began today's session with. Determine how you could support ELLs at different proficiency levels using the provided ELPS.

http://www.azed.gov/

Contact Us

Suzi Mast
K-12 Mathematics Director
602-364-4030
suzi.mast@azed.gov

Andrea Grabow
OELAS Program Specialist
602-364-1806
andrea.grabow@azed.gov